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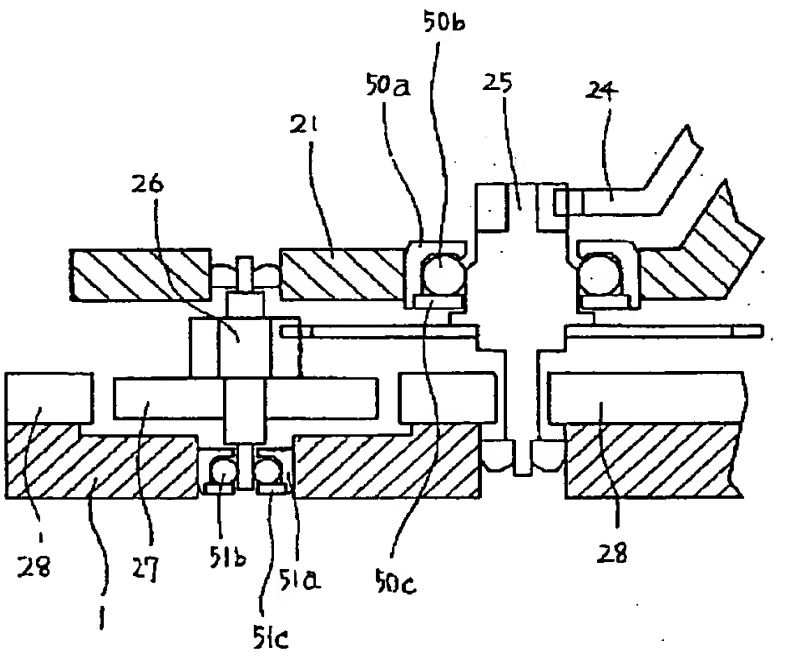
(54)【発明の名称】　回転錘を備えた時計

(57)【要約】

【課題】　発電手段である回転錘を備えた時計において、発電効率を上げると共に小型、低コスト化を図ること。

【解決手段】　発電輪列を構成する発電ロータ伝え車２５の上ほぞは、回転錘受２１に固着された軸受ボールベアリング５０により、案内されている。軸受ボールベアリング５０は、外輪５０ａが回転錘受２１と固定され、複数のボール５０ｂが直に発電ロータ伝え車２５の上ほぞと係合している。発電ロータ伝え車２５の上方向の位置決めは、外輪５０ａに固定された押え輪５０Ｃにより行われている。



【特許請求の範囲】
【請求項１】　回転錘の回転を伝える伝達輪列と噛み合い回転する発電ロータを有する回転錘を備えた時計において、
前記回転錘が第１のボールベアリングで軸受けされると共に、前記伝達輪列もしくは発電ロータのうちの少なくとも１箇所を第２のボールベアリングで軸受けしたことを特徴とする回転錘付電子時計。
【請求項２】　前記第２のボールベアリングは、前記伝達輪列もしくは前記発電ロータと当接するボールと、このボールの側面部と上部とを覆う外輪と、ボールの下部を覆う押え輪とで構成され、前記ボールは前記外輪と前記押え輪との間で少なくとも上下方向に微動可能であり、かつ前記ボールが当接する前記伝達輪列もしくは前記発電ロータも上下方向に微動可能となるように構成されていることを特徴とする請求項１記載の回転錘を備えた時計。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は、回転錘腕時計の部品配置に関する物である。
【０００２】
【従来の技術】電子時計には、特開昭６２－４９７８５のように、回転錘の動きにより小型発電機で発電し、それを２次電源に充電し、そのエネルギーで時計を駆動する自動巻発電時計が発明されている。
【０００３】この時計の場合、回転錘の片重り量が大きいほど入力エネルギーが大きくなり、発電量も大きくなるので、いかにスペース効率よく片重り量を確保するかが課題である。
【０００４】片重り量とは、回転錘の重量と、回転中心から回転錘重心までの距離の積で表されるものである。従って、重量が同じであるなら、回転錘の重量をできるだけ回転中心から離し構成することが有効といえる。
【０００５】そのため従来例では、ムーブメントを構成する輪列、コイルを初めとする内蔵部品を中心側に構成し、その外側には部品を配置せず、内蔵部品部より厚みを薄くし、その部分に回転錘厚肉部を配置するようにし、内蔵部品部上側には回転錘薄肉部を配置している。
【０００６】これは、効率的な配置であるといえるが、ムーブメントの内蔵部品を、回転錘厚肉部より小さな径の範囲に集約する必要がある。
【０００７】
【発明が解決しようとする課題】しかるに、時計の小型、薄型化を実現しようとすると、以下のような問題が生じてくる。
【０００８】自動巻発電時計の小型、薄型化をするには、ムーブメント直径が小さくても、いかに回転錘の片重り量を確保するかが課題であり、そのためにはムーブメント内蔵部品の締める範囲を極力小さくする必要がある。
【０００９】一般の水晶時計の中には、直径１０mm程度の物もあり、充分可能性はあるが、自動巻発電時計であるがため次の制約を受ける。
【００１０】携帯して動かし続けるためには、又、エネルギーの蓄積に余裕を持たせるためには、モータ消費電力を極力小さくし、かつ、発電電力を極力大きくし、消費量より発電量をより多く確保する必要がある。
【００１１】そのためモータに関する有効な手段として、コイルの起磁力を確保しながらコイル抵抗を高くする方法があるが、これはコイル体積を大きくする方向となる。
【００１２】又、発電コイルに関しては、高い誘起電圧を発生させると共に、それを電流として有効に取り出して、２次電源に充電してやる必要がある。誘起電圧は、磁束の鎖交する巻数と磁束の変化量に比例する事から、コイルの巻数を多くすることが有利である。それを電流として有効に取り出すには、コイルインピーダンス、つまりコイル抵抗を低くしてやる必要がある。これも、時計用コイルと同様に発電コイル体積を大きくする方向となる。
【００１３】従って、小型、薄型化のためにムーブメント内蔵部品範囲をそのまま小さくすると、発電性能を著しくて低下させることになり、実使用にそぐわない物となる。
【００１４】
【課題を解決するための手段】本発明の回転錘を備えた時計は、回転錘の回転を伝える伝達輪列と噛み合い回転する発電ロータを有するものであって、回転錘が第１のボールベアリングで軸受けされると共に、伝達輪列もしくは発電ロータのうちの少なくとも１箇所を第２のボールベアリングで軸受けしたことを特徴とする。
【００１５】この場合、第２のボールベアリングは、伝達輪列もしくは発電ロータと当接するボールと、このボールの側面部と上部とを覆う外輪と、ボールの下部を覆う押え輪とで構成され、ボールは外輪と押え輪との間で少なくとも上下方向に微動可能であり、かつボールが当接する伝達輪列もしくは発電ロータも上下方向に微動可能となるように構成されていることが望ましい。
【００１６】
【発明の実施の形態】図１は本発明実施例の組立平面図、図２～図７は同じく組立断面図を示す。
【００１７】図において、１はムーブメントのベースをなす地板、２は時計用コイル、３はステータ、４はロータを示す。ロータ４の回転は、五番車５を介して四番車７、三番車８、二番車９、日の裏車１０、筒車１１へと伝達される。又、日の裏車１０は小鉄車１２と噛み合っている。これら輪列群は、輪列受け１３により軸支されている。
【００１８】片重りの回転錘２０は、回転錘受２１に固

着されたボールベアリング２２に回転錘ネジ２３で、固定されている。回転錘２０の下には、回転錘車２４が有り、同様に固定されている。回転錘車２４は、かな部２５ａと歯車部２５ｂを持つ発電ロータ伝え車２５のかな部と噛み合い、又、歯車部２５ｂは発電ロータ２６のかな部２６ａと噛み合い、回転錘の回転を伝達する。回転錘車２４から発電ロータ２６までの輪列は、３０から２００倍程度に増速されており、回転錘２０の回転により発電ロータ２６は高速で回転することになる。尚、増速比は発電機の性能や、時計の仕様により、自由に設定することが可能である。発電ロータ２６には、永久磁石２７が固着されているので、回転のたびに方向の異なる磁束が発電ステータ２８を経由し、発電コイル２９に流れ、コイルに誘起電圧が発生する。発電コイル２９の端末は、コイルリード基板３９のパターンに接続され、止めねじ４４で回路押え板３８を介して回路基板３７と圧接し、回路と導通されている。発電コイル２９と発電ステータ２８は止めねじ４６、４７で圧接され、磁気経路を形成しているが、前記コイルリード基板３９と回路基板３７の接続を平面的に外し、薄くしている。

【００１９】次に回路関係として、３１が水晶ユニット、３２がＭＯＳＩＣチップ、３３が補助コンデンサ、３４が整流のためのダイオード、３５、３６は昇圧コンデンサを示す。これら素子は、フレキシブルな回路基板３７に実装されている。回路基板３７は、ばね部を有した回路押え板３８で上から押さえられ、ねじ固定されている。４０は２次電源のキャパシタであり、それぞれの電極はプラス端子（図示せず）、マイナス端子により、回路基板３７のパターンと電気接続されている。本例の回路は、２次電源４０の電圧を昇圧コンデンサ３６で昇圧し、補助コンデンサ３３に蓄え時計を駆動する特開昭６０－２０３８８７の方式を採用している。

【００２０】１４は外部操作部材で、この操作を制御するおしどり１５は、外部操作部材１４の溝と係合し、かんぬき１６により位置規制されている。カンヌキ１６は、外部操作部材１４に案内されたつづみ車１７の溝と係合している。又、外部操作部材１４の動きに連動して、輪列を規正すると共に、回路をリセットする規正レバーを所有しているが、図示はしていない。おしどり１５とかんぬき１６は、止めねじ４５で固定されたおしどり押え１８により、上方向を決められている。これら切換の作動については、周知であるので説明を省く。

【００２１】前述において、回転錘２０は外周部に厚肉部２０ａを有し、ムーブメントを構成するほとんどの内蔵部品の外側を回転する軌跡をとっている。その厚肉部に対し、発電コイル２９は少なくとも一部が、本案ではコイル巻線部が平面的に重なっている。又、発電コイル２９の巻線部は、発電ロータ伝え車２５の歯車２５ｂと重なっている。又、回路を構成するＭＯＳＩＣチップ３２及び回路基板３７と重なっている。

【００２２】図７において、発電輪列を構成する発電ロータ伝え車２５の上ほぞは、回転錘受２１に固着された軸受ボールベアリング５０により、案内されている。軸受ボールベアリング５０は、外輪５０ａが回転錘受２１と固定され、複数のボール５０ｂが直に発電ロータ伝え車２５の上ほぞと係合している。発電ロータ伝え車２５の上方向の位置決めは、外輪５０ａに固定された押え輪５０Ｃにより行われている。又、外輪５０ａは、非磁性の材料で作られている。これは、発電機に及ぼす磁気的影響を減少させるためであるが、影響の無視できる場合はスチールなどの磁性材でも良い。又、影響の大きい場合には、外輪だけでなく他の部分についても非磁性材に変えることも考えられる。又、発電ロータ２６の下ほぞ側にも軸受ベアリング５１を使用している。こちらも材料については、前述同様磁性材、非磁性材を使い分ける必要があるが、磁石近傍ということもあり、少なくとも外輪は非磁性材にすることが、望ましい。軸受ベアリング５１は外輪５１ａ，ボール５１ｂ、押え輪５１Ｃからなり、外輪５１ａで発電ロータ２６のアガキを決めている。

【００２３】軸受ベアリング５０、５１は共にリテーナを使用せず、小型化、低コスト化を狙っているが、リテーナを使用しても問題ない。軸受けベアリング５０は、外輪５１ａの穴付近がボール５０ｂ側に突出し、押え輪５０ｃとのスキマがボール５０ｂの外径より小さくなっている。そのため、発電ロータ伝え車２５の組み込み前であっても、ボール５０ｂが外れてしまうことはない。又、発電ロータ伝え車２５の組み込み前、ボールがある程度ずれるので、外輪５０ａとのスキマがあき、洗浄で汚れが落ち易くなっている。軸受ベアリング５１についても、外輪５１ａ、押え輪５１ｃにあいている穴が、ボール５１ｂの外径より小さいので、ボールの外れはなく同様の効果を持つ。前記ベアリングは両方とも径方向の効果を主としているので、上下方向のガタは大きくても良い。

【００２４】本例では、発電ロータ伝え車２５の上と、発電ロータ２６の下にベアリングを使用しているが、これは以下の理由による。発電ロータ伝え車２５は、回転錘車２４と噛み合わせるために、回転錘受け２１の上側にかな部２５ａが飛び出している。従って、受と地板で上下から案内する一般の構成をとるには、軸受部径をかな外径より大きくすることになり、軸受負荷が増大する。又、発電ロータ２６と磁石２７が発電ステータ２８に引きつけられており、その力が下ほぞ側に加わるので、負荷が増大する。これらの部分にベアリングを用いることにより、軸受負荷を減らし発電効率をアップさせる効果がある。尚、発電ロータ伝え車の下や、発電ロータの上についても採用すれば、より効率よくなる。

【００２５】

【発明の効果】以上の発明により、以下の効果を有す

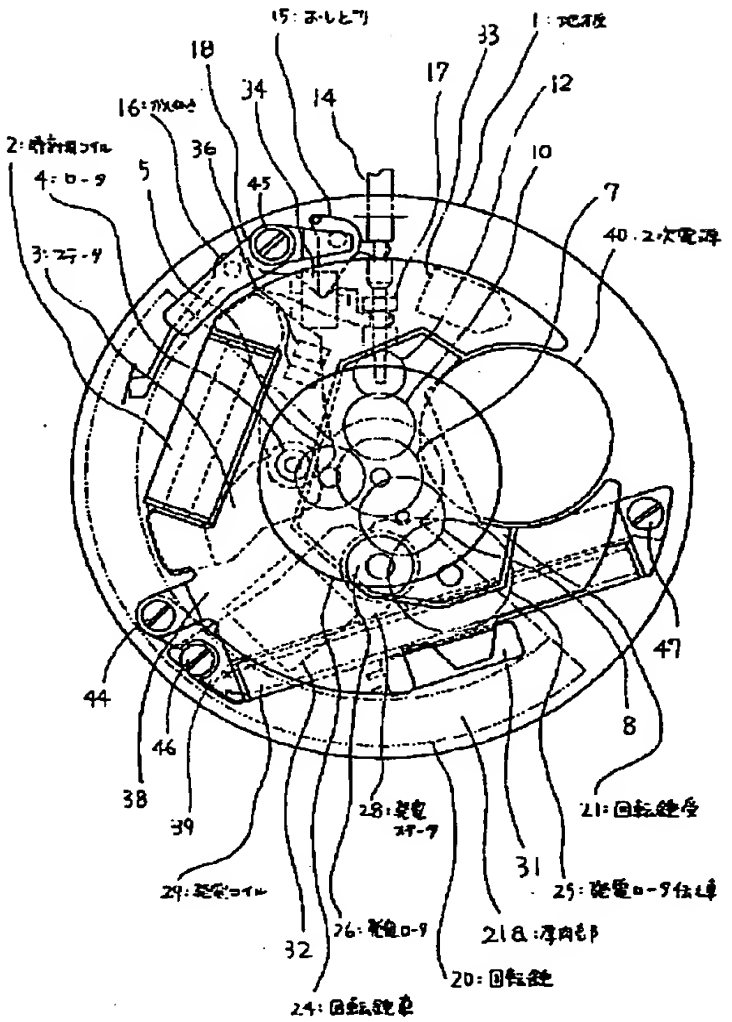
る。
【００２６】発電量は、コイルに発生した誘起電圧を電流として取り出している。誘起電圧はコイル線の巻数と、磁束の変化量に比例しているため、コイルの巻数が多いほど高く発生させられ、有利である。又、その誘起電圧を電流として取り出せる量は、コイルのインピーダンスに反比例し、誘起電圧に比例し、かつ、コイルのインピーダンスは周知の通りコイル抵抗が高いほど大きくなるので、コイル抵抗は小さい方が有利といえる。
【００２７】従来例の場合、発電コイル２９が回転錘外周厚肉部２０ａの回転軌跡内側に配置されているので、回転錘径が小さくなると、コイル長さも短くなり、巻数が減少し、誘起電圧も減少する。これを防ぐために、線径の細いコイル線を巻いて巻数を確保しようとすると、コイル抵抗の増加となり、発電量が減少することになる。しかるに本案では、コイル巻線部と回転錘の厚肉部を重ねてあるので、コイル巻部の厚みは薄くなるが、長さは多くとれる。
【００２８】細く長いコイルと、太く短いコイルを比較すると、同じ巻数では前者の方がコイル線長さを短くでき、コイル抵抗も下げられる。従って、その分だけ発電に対して有利な設定が可能となる。従来構造では、発電コイル２９と発電ロータ伝え車２５の歯車２９ｂを重ねることは不可能であるので、発電コイルに制約されて、歯車外径は大きくできない。そのため、回転錘車２４から発電ロータ２６までの増速比が小さくなったり、増速比を確保するために輪列を一段増やしたりすることになる。しかるに本案では、発電ロータ伝え車２５の歯車２５ｂと発電コイル２９が重ねられるので、歯車外径を大きくすることができ、発電に充分な増速比を確保できる。同様に、ＭＯＳＩＣチップ３２をコイルと重ねられるので、絶対面積の少ない女持ちムーブメントの平面レイアウトに有利である。
【００２９】本案は、発電コイルを回転錘厚肉部の下に配置しているが、時計用コイルを同様に配置することも可能である。しかし一般的に、コイルを巻いている磁心長さが長くなると、耐磁性に対し弱くなるといわれているので、磁心断面を大きくしたり、別な耐磁手段の検討が必要である。
【００３０】又、発電輪列に軸受ボールベアリング５０、５１を用いているので、発電効率の上昇にもなっている。軸受ボールベアリングは、発電ロータ伝え車２５及び発電ロータ２６の高さ決めを、回転錘受２１もしくは地板１に固定された部分で行っている。一般的に固定部分で高さ決めを行うということは、負荷の増加となり、実施されていないが、時計の場合高さ方向に加わる負荷は、輪列の自重だけであり、発電時に加わる横方向の力が圧倒的に強く、又、発電ロータについては発電ステータに引かれる磁力により浮上しており、衝撃時以外は当たらないので、高さ方向は無視できる。これにより、ベアリングに内輪を設ける必要がなく、構造が簡単となり、安価でかつ小型化ができる。
【００３１】切換については、おしどりが回転錘外周の厚肉部と重なるごとくムーブメント内蔵部品部より、外側に配置してある。おしどりは、外部操作部材の高さ位置に制約されるものであり、回転錘厚肉部は外部操作部材を、高さ方向で逃げているので、高さ方向の逃げは比較的容易である。これにより切換に要するスペースは、ムーブメントの外周側に配置できるので、その部分に補助コンデンサ３３やダイオード３４など、比較的厚い電気素子を配置することができ、小型化に効果を上げている。

【図面の簡単な説明】
【図１】　本発明実施例の平面図。
【図２】　本発明実施例の断面図。
【図３】　本発明実施例の断面図。
【図４】　本発明実施例の断面図。
【図５】　本発明実施例の断面図。
【図６】　本発明実施例の断面図。
【図７】　本発明実施例の断面図。

【符号の説明】
１　地板
２　時計用コイル
３　ステータ
４　ロータ
５　五番車
７　四番車
８　三番車
９　二番車
１０　日の裏車
１１　筒車
１２　小鉄車
１３　輪列受
１４　外部操作部材
１５　おしどり
１６　かんぬき
１７　つづみ車
１８　おしどり押え
２０　回転錘
２１　回転錘受
２２　ボールベアリング
２３　回転錘ねじ
２４　回転錘車
２５　発電ロータ伝え車
２６　発電ロータ
２７　磁石
２８　発電ステータ
２９　発電コイル
３１　水晶ユニット
３２　ＭＯＳＩＣチップ

３３　補助コンデンサ
３４　ダイオード
３５、３６　昇圧コンデンサ
３７　回路基板
３８　回路押え板
３９　コイルリード基板
４０　２次電源
４１　マイナス端子
４４、４５、４６、４７　止めねじ
５０　軸受ボールベアリング
５１　軸受ボールベアリング

【図１】



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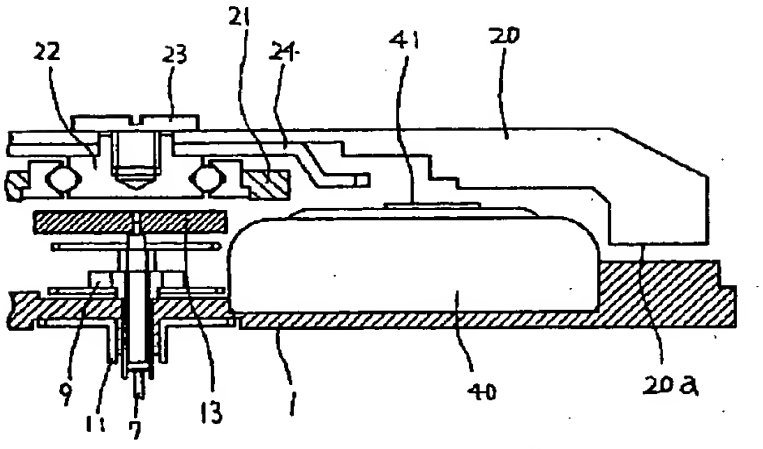

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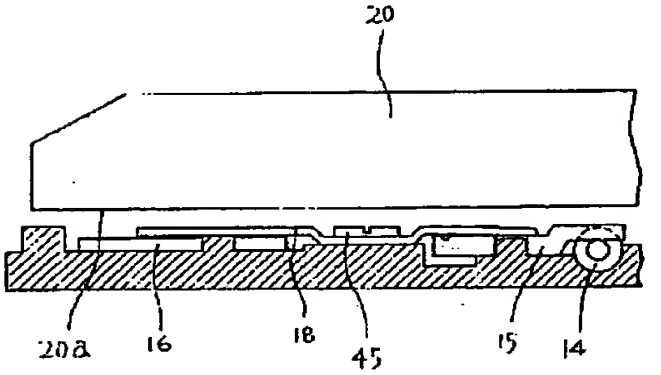

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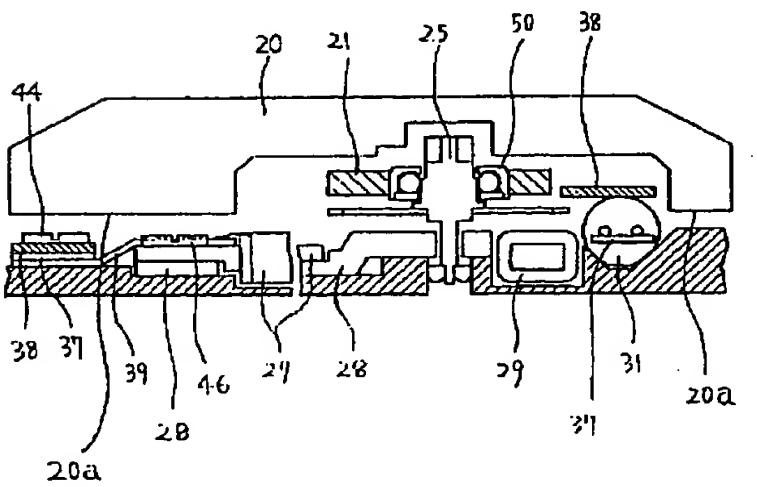

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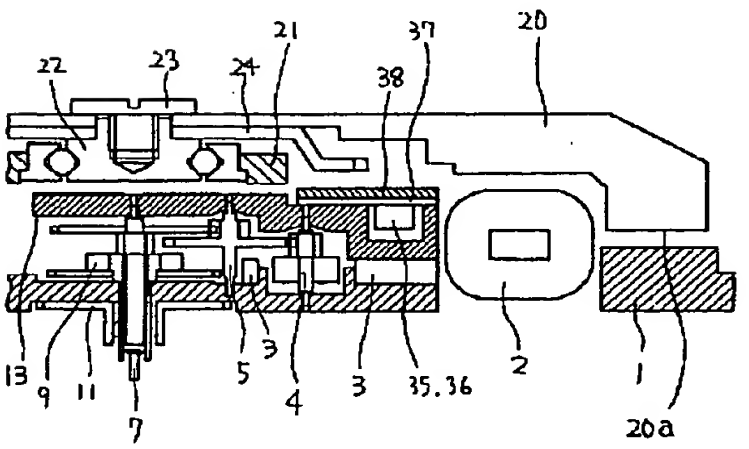

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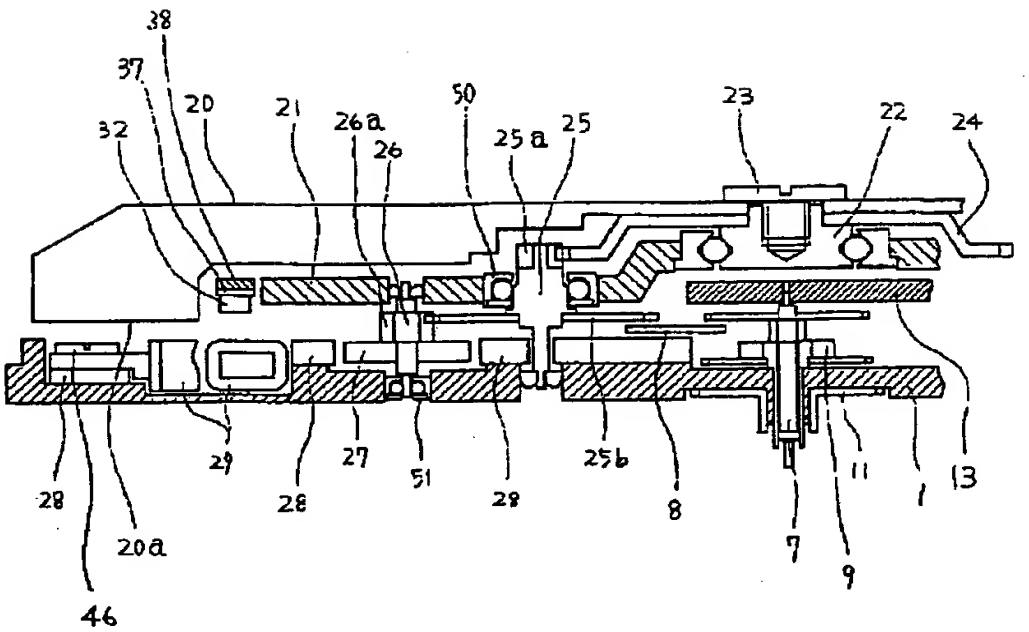
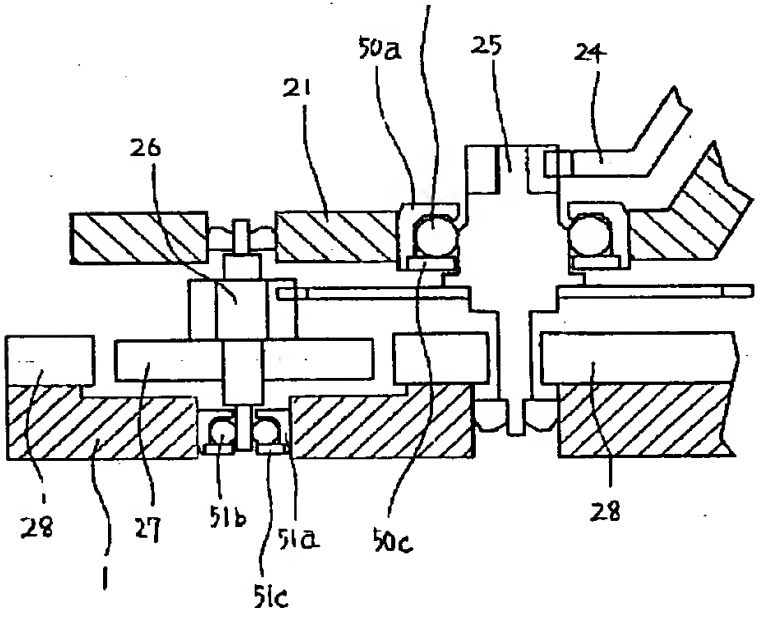

38
37
20
21
26a
26
50
25a
25
23
22
24
32
28
20a
46
29
28
27
51
28
25b
8
7
9
11
1
13

【図７】


50b
50a
25
24
21
26
28
1
27
51b
51c
51a
50c
28

PATENT ABSTRACTS OF JAPAN

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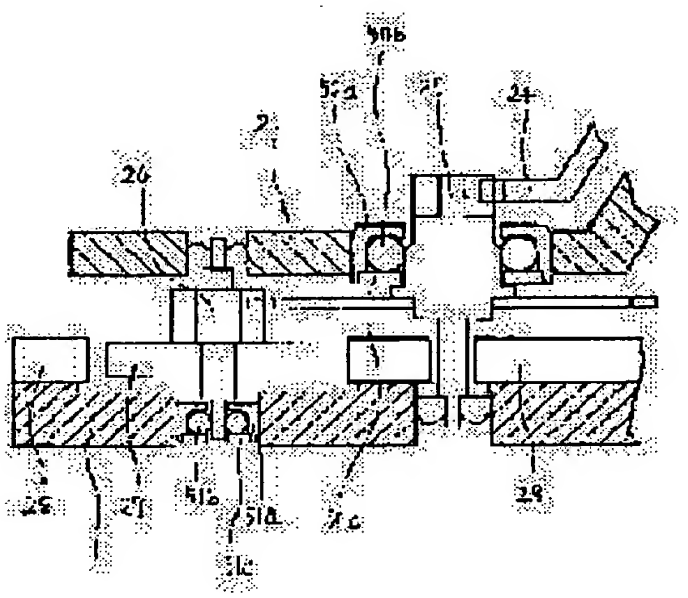
(71)Applicant : SEIKO EPSON CORP
(72)Inventor : NAGAO SHOICHI

(54) TIMEPIECE PROVIDED WITH ROTARY WEIGHT

(57)Abstract:
PROBLEM TO BE SOLVED: To improve power generating efficiency and attain miniaturization and decrease of cost, in a timepiece provided with rotary weight as a power generating means.
SOLUTION: The upper tenon of a power generating rotor transmission wheel 25 constituting a generating wheel line is guided with a shaft receiving ball bearing fixedly secured with a rotary weight receiver 21. In the shaft receiving ball bearing, the outer ring 50a is fixed to the rotary weight 21, a plurality of balls 50b are directly engaged with the upper tenon of the power generating rotor transmission wheel 25. Positioning in the upper direction of the power generating rotor transmission wheel 25 is performed by a presser ring 50c fixed to the outer ring 50a.



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1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.**** shows the word which can not be translated.

3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] The electronic clock with a rotation spindle characterized by carrying out the bearing of at least one in said transfer wheel train or generation-of-electrical-energy Rota by the 2nd ball bearing in the clock equipped with the rotation spindle which has generation-of-electrical-energy Rota which gears with the transfer wheel train which tells rotation of a rotation spindle, and is rotated while the bearing of said rotation spindle is carried out by the 1st ball bearing.

[Claim 2] The ball with which said 2nd ball bearing contacts said transfer wheel train or said generation-of-electrical-energy Rota, A wrap outer ring of spiral wound gasket and the lower part of a ball are constituted from the wrap junk ring in the lateral portion and the upper part of this ball. Said ball is the clock equipped with the rotation spindle according to claim 1 characterized by being constituted so that jogging also of said transfer wheel train with which it can move slightly in the vertical direction at least between said outer rings of spiral wound gasket and said junk rings, and said ball contacts, or said generation-of-electrical-energy Rota in the vertical direction may be attained.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention is an object about components arrangement of a rotation spindle wrist watch.

[0002]

[Description of the Prior Art] Like JP,62-49785,A, it generates electricity with a small generator by motion of a rotation spindle, it is charged at a secondary power source, and the automatic volume generation-of-electrical-energy clock which drives a clock with the energy is invented by the electronic clock.

[0003] Since in the case of this clock input energy becomes large and the amount of generations of electrical energy also becomes large so that the amount of piece weights of a rotation spindle is large, it is a technical problem how the amount of piece weights is secured with sufficient space efficiency.

[0004] The amount of piece weights is expressed with the product of the weight of a rotation spindle, and the distance from the center of rotation to a rotation spindle center of gravity. Therefore, if weight is the same, it can be said that it is effective to detach and constitute the weight of a rotation spindle from the center of rotation as much as possible.

[0005] Therefore, the wheel train which constitutes a movement, and the built-in components which make a coil the start were constituted from a conventional example in the core side, components have not been arranged in the outside, but from the built-in components section, thickness was made thin, the rotation spindle heavy-gage part was arranged into the part, and the rotation spindle thin-walled part is arranged to the built-in components section up side.

[0006] Although it can say that this is efficient arrangement, it is necessary to collect the built-in components of a movement in the range of a path smaller than a rotation spindle heavy-gage part.
[0007]
[Problem(s) to be Solved by the Invention] However, if it is going to realize small [of a clock], and thin shape-ization, the following problems will arise.
[0008] In order to carry out small [of an automatic volume generation-of-electrical-energy clock], and thin shape-ization, even if a movement diameter is small, it is a technical problem how the amount of piece weights of a rotation spindle is secured, and it is necessary to make small the range which components with a built-in movement fasten for that purpose as much as possible.
[0009] Although there is also an object with a diameter of about 10mm and possibility of enough is in a common crystal clock, the next constraint is received in hard [slight / which is an automatic volume generation-of-electrical-energy clock].
[0010] In order to carry and to continue moving, and in order to give allowances to are recording of energy, it is necessary to make motor power consumption small as much as possible, and to enlarge generated output as much as possible, and to secure more amounts of generations of electrical energy from consumption.
[0011] Therefore, although there is the approach of making coil resistance high as an effective means about a motor, securing the magnetomotive force of a coil, this serves as a direction which enlarges the coil volume.
[0012] Moreover, while generating high induced voltage about a magneto coil, it is necessary to take it out effectively as a current and to charge a secondary power source. Since induced voltage is proportional to the variation of the number of turns which magnetic flux interlinks, and magnetic flux, it is advantageous to make [many] the number of turns of a coil. In order to take it out effectively as a current, it is necessary to make a coil impedance, i.e., coil resistance, low. It becomes the direction where this as well as the coil for clocks enlarges the magneto-coil volume.
[0013] Therefore, if the components range with a built-in movement is made small as it is for small and thin-shape-izing, it will be remarkable, the generation-of-electrical-energy engine performance will be made to fall, and it will become a not suitable object at real use.
[0014]
[Means for Solving the Problem] The clock equipped with the rotation spindle of this invention is characterized by carrying out the bearing of at least one in a transfer wheel train or generation-of-electrical-energy Rota by the 2nd ball bearing while having generation-of-electrical-energy Rota which gears with the transfer wheel train which tells rotation of a rotation spindle, and is rotated and carrying out the bearing of the rotation spindle by the 1st ball bearing.
[0015] In this case, it is desirable to be constituted so that jogging also of the transfer wheel train or generation-of-electrical-energy Rota where the 2nd ball bearing consists of [upper part / the ball which contacts a transfer wheel train or generation-of-electrical-energy Rota, and / of this ball / the lateral portion and the upper part] the wrap junk rings in a wrap outer ring of spiral wound gasket and the lower part of a ball, and a ball can be moved slightly in the vertical direction at least between an outer ring of spiral wound gasket and the junk ring, and a ball contacts in the vertical direction may be attained.
[0016]
[Embodiment of the Invention] The assembly top view of this invention example, drawing 2 - drawing 7 are the same, and drawing 1 shows a built-up-section Fig.
[0017] In drawing, in the cope plate with which 1 makes the base of a movement, and 2, the coil for clocks and 3 show a stator and 4 shows Rota. Rotation of Rota 4 is transmitted to the No. 4 vehicle vehicle vehicle 9 of No. 8 or 2 of No. 7 or 3, the back vehicle 10 of a day, and a scoop wheel 11 through the No. 5 vehicle 5. Moreover, the back vehicle 10 of a day has geared with the Kotetsu vehicle 12. These wheel train group is supported to revolve with the wheel train receptacle 13.
[0018] The rotation spindle 20 of piece weight is the rotation spindle screw 23, and is being fixed to the ball bearing 22 which fixed to rotation **** 21. Under the rotation spindle 20, there is

rotation cord weight 24 and it is fixed similarly. It gears with kana section 25a and the kana section of the generation-of-electrical-energy Rota tradition vehicle 25 with gearing section 25b, and gearing section 25b gears with kana section 26a of generation-of-electrical-energy Rota 26, and the rotation cord weight 24 transmits rotation of a rotation spindle. About 30 to 200 times accelerates the wheel train from the rotation cord weight 24 to generation-of-electrical-energy Rota 26, and generation-of-electrical-energy Rota 26 will be rotated by rotation of the rotation spindle 20 at high speed. In addition, an accelerating ratio can be freely set up with the engine performance of a generator, and the specification of a clock. Since the permanent magnet 27 has fixed in generation-of-electrical-energy Rota 26, the magnetic flux from which a direction differs at every rotation flows to a magneto coil 29 via the generation-of-electrical-energy stator 28, and induced voltage occurs in a coil. It connected with the pattern of the coil lead substrate 39, and the pressure welding of the terminal of a magneto coil 29 was carried out to the circuit board 37 through the circuit pressure plate 38 with the setscrew 44, and it has flowed with the circuit. Although the pressure welding of a magneto coil 29 and the generation-of-electrical-energy stator 28 is carried out with setscrews 46 and 47 and they form the magnetic path, connection of said coil lead substrate 39 and circuit board 37 is removed superficially, and they make it thin.

[0019] Next, as circuit relation, as for the diode for an MOSIC chip and rectification [33] of an auxiliary capacitor and 34 of the Xtal unit and 32, and 35 and 36, 31 shows a pressure-up capacitor. These components are mounted in the flexible circuit board 37. The circuit board 37 is pressed down and fixed with screws from the top with the circuit pressure plate 38 with the spring section. 40 is the capacitor of a secondary power source and electrical connection of each electrode is carried out to the pattern of the circuit board 37 with the plus terminal (not shown) and the minus terminal. The circuit of this example carried out the pressure up of the electrical potential difference of the secondary power source 40 by the pressure-up capacitor 36, and the method of JP,60-203887,A which stores in the auxiliary capacitor 33 and drives a clock is used for it.

[0020] 14 is an external operating member, this actuation is controlled and pushed, **** 15 engages with the slot of the external operating member 14, and location regulation is carried out with the locking bar 16. The plate 16 is engaging with the slot of ****** 17 shown up at the external operating member 14. Moreover, illustration has not been carried out, although the readjustment lever which resets a circuit is owned while a motion of the external operating member 14 is interlocked with and readjusting a wheel train. It pushes and does not keep not solving **** 15, and it was fixed with the setscrew 45, and 16 is pushed, and is having above determined by the **** presser foot 18. About actuation of these change-overs, since it is common knowledge, explanation is omitted.

[0021] In the above-mentioned, the rotation spindle 20 had heavy-gage part 20a in the periphery section, and has taken the locus turning around the outside of almost all the built-in component that constitute a movement. In some magneto coils [at least] 29, in ****, the coil coil section has lapped superficially to the heavy-gage part. Moreover, the coil section of a magneto coil 29 has lapped with gearing 25b of the generation-of-electrical-energy Rota tradition vehicle 25. Moreover, it has lapped with the MOSIC chip 32 and the circuit board 37 which constitute a circuit.

[0022] In drawing 7 , the upper tenon of the generation-of-electrical-energy Rota tradition vehicle 25 which constitutes a generation-of-electrical-energy wheel train is guided by the bearing ball bearing 50 which fixed to rotation **** 21. Outer-ring-of-spiral-wound-gasket 50a is fixed with rotation **** 21, and, as for the bearing ball bearing 50, two or more ball 50b is engaging with the upper tenon of the generation-of-electrical-energy Rota tradition vehicle 25 soon. Above positioning of the generation-of-electrical-energy Rota tradition vehicle 25 is performed by junk ring 50C fixed to outer-ring-of-spiral-wound-gasket 50a. Moreover, outer-ring-of-spiral-wound-gasket 50a is made from the nonmagnetic ingredient. Although this is for decreasing the magnetic effect affect a generator, when effect can be disregarded, magnetic material, such as steel, is sufficient as it. Moreover, when effect is large, not only an outer ring of spiral wound gasket but the thing changed into nonmagnetic material about other parts is considered. Moreover, the bearing bearing 51 is used also for the bottom tenon side of

generation-of-electrical-energy Rota 26. Although it is necessary to use magnetic material and nonmagnetic material also here properly like the above-mentioned about an ingredient, since it says near the magnet, as for an outer ring of spiral wound gasket at least, it is desirable to make it nonmagnetic material. The bearing bearing 51 consisted of outer-ring-of-spiral-wound-gasket 51a, ball 51b, and junk ring 51C, and has determined AGAKI of generation-of-electrical-energy Rota 26 by outer-ring-of-spiral-wound-gasket 51a.

[0023] Although they do not use a retainer but are aiming at a miniaturization and low cost-ization, even if both the bearing bearings 50 and 51 use a retainer, they are satisfactory. As for the bearing bearing 50, near the hole of outer-ring-of-spiral-wound-gasket 51a has become [the skimmer with projection and junk ring 50c] smaller than the outer diameter of ball 50b at the ball 50b side. Therefore, even if it is before inclusion of the generation-of-electrical-energy Rota tradition vehicle 25, ball 50b does not separate. Moreover, before inclusion of the generation-of-electrical-energy Rota tradition vehicle 25, since a ball shifts to some extent, a skimmer with outer-ring-of-spiral-wound-gasket 50a gets bored, and dirt is easy to come off by washing. Since the hole which has opened also about the bearing bearing 51 in outer-ring-of-spiral-wound-gasket 51a and junk ring 51c is smaller than the outer diameter of ball 51b, there is no blank of a ball and it has the same effectiveness. Since the effectiveness of both of the direction of a path is mainly in said bearing, the backlash of the vertical direction may be large.

[0024] In this example, although bearing is used for the bottom of generation-of-electrical-energy Rota 26 the generation-of-electrical-energy Rota tradition vehicle 25 top, this is based on the following reasons. In order to engage with the rotation cord weight 24, kana section 25a is sticking out of the generation-of-electrical-energy Rota tradition vehicle 25 to the rotation spindle receptacle 21 up side. Therefore, in order to take the general configuration guided from the upper and lower sides with a carrier and a cope plate, the diameter of bearing will be made larger than a kana outer diameter, and a bearing load increases. Moreover, since it is drawn by generation-of-electrical-energy Rota 26 and the magnet 27 to the generation-of-electrical-energy stator 28 and the force joins a bottom tenon side, a load increases. By using bearing for these parts, it is effective in reducing a bearing load and making generating efficiency raise. In addition, it will become more efficient if it adopts also about the bottom of a generation-of-electrical-energy Rota tradition vehicle, and a generation-of-electrical-energy Rota top.

[0025]

[Effect of the Invention] By the above invention, it has the following effectiveness.

[0026] The amount of generations of electrical energy has taken out as a current the induced voltage generated in the coil. Since induced voltage is proportional to the number of turns of a coil line, and the variation of magnetic flux, it is generated so highly that there are many number of turns of a coil, and it is advantageous. Moreover, the amount which can take out the induced voltage as a current is proportional to induced voltage in inverse proportion to the impedance of a coil, and since the impedance of a coil becomes so large that coil resistance is high as everyone knows, it can be said that the smaller one of coil resistance is advantageous.

[0027] Since the magneto coil 29 is arranged inside [rotation locus] rotation spindle periphery heavy-gage part 20a in the case of the conventional example, if rotation **** becomes small, coil length will also become short, number of turns will decrease, and induced voltage will also decrease. In order to prevent this, when the thin coil line of a wire size tends to be coiled and it is going to secure number of turns, it becomes the increment in coil resistance and the amount of generations of electrical energy will decrease. However, although the thickness of the coil volume section becomes thin in **** since the coil coil section and the heavy-gage part of a rotation spindle are piled up, many die length can be taken.

[0028] If a thin long coil is compared with a thick short coil, in the same number of turns, former one can shorten coil line die length, and coil resistance will also be lowered. Therefore, an advantageous setup only of the part is attained to a generation of electrical energy. Conventionally, with structure, since it is impossible to pile up gearing 29b of a magneto coil 29 and the generation-of-electrical-energy Rota tradition vehicle 25, it is restrained by the magneto

coil and a gearing outer diameter is not made greatly. Therefore, the accelerating ratio from the rotation cord weight 24 to generation-of-electrical-energy Rota 26 becomes small, or in order to secure an accelerating ratio, one step of wheel train will be increased. However, in ****, since gearing 25b of the generation-of-electrical-energy Rota tradition vehicle 25 and a magneto coil 29 pile up, a gearing outer diameter can be enlarged and sufficient accelerating ratio for a generation of electrical energy can be secured. Similarly, since the MOSIC chip 32 is repeated with a coil, it is advantageous to the flat-surface layout of a ****** movement with little [absolutely] area.

[0029] Although **** arranges the magneto coil under a rotation spindle heavy-gage part, it is also possible to arrange the coil for clocks similarly. However, if the core die length which is rolling the coil generally becomes long, since it is said that it becomes weak to antimagnetic, another ******-proof in enlarging a core cross section needs to be inquired.

[0030] Moreover, since the bearing ball bearings 50 and 51 are used for the generation-of-electrical-energy wheel train, it is also the rise of generating efficiency. The bearing ball bearing is performing the height arrangement of the generation-of-electrical-energy Rota tradition vehicle 25 and generation-of-electrical-energy Rota 26 in the part fixed to rotation **** 21 or a cope plate 1. Although it does not carry out, since it becomes the increment in a load to perform a height arrangement by the fixed portion generally, and the load which is added in the height direction in the case of a clock is only the self-weight of a wheel train, its lateral force in_which of it is added at the time of a generation of electrical energy is overwhelmingly strong, and it has surfaced by the magnetism lengthened by the generation-of-electrical-energy stator about generation-of-electrical-energy Rota and does not hit other than the time of an impact, the height direction can be disregarded. It is not necessary to prepare an inner ring of spiral wound gasket in bearing, and structure becomes easy by this, it is cheap and a miniaturization is possible.

[0031] About the change-over, it arranges outside the components section with a built-in movement so that it may push and **** may lap with the heavy-gage part of a rotation spindle periphery. Since it pushes, **** is restrained in the height location of an external operating member and the rotation spindle heavy-gage part has escaped the external operating member in the height direction, the recess of the height direction is comparatively easy. Since the tooth space which a change-over takes to this can be arranged to the periphery side of a movement, it can arrange comparatively thick electric elements, such as the auxiliary capacitor 33 and diode 34, into the part, and is raising effectiveness to the miniaturization.

TECHNICAL FIELD

[Field of the Invention] This invention is an object about components arrangement of a rotation spindle wrist watch.

PRIOR ART

[Description of the Prior Art] Like JP,62-49785,A, it generates electricity with a small generator by motion of a rotation spindle, it is charged at a secondary power source, and the automatic volume generation-of-electrical-energy clock which drives a clock with the energy is invented by the electronic clock.

[0003] Since in the case of this clock input energy becomes large and the amount of generations of electrical energy also becomes large so that the amount of piece weights of a rotation spindle is large, it is a technical problem how the amount of piece weights is secured with sufficient space efficiency.

[0004] The amount of piece weights is expressed with the product of the weight of a rotation spindle, and the distance from the center of rotation to a rotation spindle center of gravity. Therefore, if weight is the same, it can be said that it is effective to detach and constitute the weight of a rotation spindle from the center of rotation as much as possible.

[0005] Therefore, the wheel train which constitutes a movement, and the built-in components

which make a coil the start were constituted from a conventional example in the core side, components have not been arranged in the outside, but from the built-in components section, thickness was made thin, the rotation spindle heavy-gage part was arranged into the part, and the rotation spindle thin-walled part is arranged to the built-in components section up side.
[0006] Although it can say that this is efficient arrangement, it is necessary to collect the built-in components of a movement in the range of a path smaller than a rotation spindle heavy-gage part.

EFFECT OF THE INVENTION

[Effect of the Invention] By the above invention, it has the following effectiveness.
[0026] The amount of generations of electrical energy has taken out as a current the induced voltage generated in the coil. Since induced voltage is proportional to the number of turns of a coil line, and the variation of magnetic flux, it is generated so highly that there are many number of turns of a coil, and it is advantageous. Moreover, the amount which can take out the induced voltage as a current is proportional to induced voltage in inverse proportion to the impedance of a coil, and since the impedance of a coil becomes so large that coil resistance is high as everyone knows, it can be said that the smaller one of coil resistance is advantageous.
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[0030] Moreover, since the bearing ball bearings 50 and 51 are used for the generation-of-electrical-energy wheel train, it is also the rise of generating efficiency. The bearing ball bearing is performing the height arrangement of the generation-of-electrical-energy Rota tradition vehicle 25 and generation-of-electrical-energy Rota 26 in the part fixed to rotation **** 21 or a cope plate 1. Although it does not carry out, since it becomes the increment in a load to perform a height arrangement by the fixed portion generally, and the load which is added in the height direction in the case of a clock is only the self-weight of a wheel train, its lateral force in_which of it is added at the time of a generation of electrical energy is overwhelmingly strong, and it has surfaced by the magnetism lengthened by the generation-of-electrical-energy stator about generation-of-electrical-energy Rota and does not hit other than the time of an impact, the height direction can be disregarded. It is not necessary to prepare an inner ring of spiral wound

gasket in bearing, and structure becomes easy by this, it is cheap and a miniaturization is possible.
[0031] About the change-over, it arranges outside the components section with a built-in movement so that it may push and **** may lap with the heavy-gage part of a rotation spindle periphery. Since it pushes, **** is restrained in the height location of an external operating member and the rotation spindle heavy-gage part has escaped the external operating member in the height direction, the recess of the height direction is comparatively easy. Since the tooth space which a change-over takes to this can be arranged to the periphery side of a movement, it can arrange comparatively thick electric elements, such as the auxiliary capacitor 33 and diode 34, into the part, and is raising effectiveness to the miniaturization.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, if it is going to realize small [of a clock], and thin shape-ization, the following problems will arise.
[0008] In order to carry out small [of an automatic volume generation-of-electrical-energy clock], and thin shape-ization, even if a movement diameter is small, it is a technical problem how the amount of piece weights of a rotation spindle is secured, and it is necessary to make small the range which components with a built-in movement fasten for that purpose as much as possible.
[0009] Although there is also an object with a diameter of about 10mm and possibility of enough is in a common crystal clock, the next constraint is received in hard [slight / which is an automatic volume generation-of-electrical-energy clock].
[0010] In order to carry and to continue moving, and in order to give allowances to are recording of energy, it is necessary to make motor power consumption small as much as possible, and to enlarge generated output as much as possible, and to secure more amounts of generations of electrical energy from consumption.
[0011] Therefore, although there is the approach of making coil resistance high as an effective means about a motor, securing the magnetomotive force of a coil, this serves as a direction which enlarges the coil volume.
[0012] Moreover, while generating high induced voltage about a magneto coil, it is necessary to take it out effectively as a current and to charge a secondary power source. Since induced voltage is proportional to the variation of the number of turns which magnetic flux interlinks, and magnetic flux, it is advantageous to make [many] the number of turns of a coil. In order to take it out effectively as a current, it is necessary to make a coil impedance, i.e., coil resistance, low. It becomes the direction where this as well as the coil for clocks enlarges the magneto-coil volume.
[0013] Therefore, if the components range with a built-in movement is made small as it is for small and thin-shape-izing, it will be remarkable, the generation-of-electrical-energy engine performance will be made to fall, and it will become a not suitable object at real use.

MEANS

[Means for Solving the Problem] The clock equipped with the rotation spindle of this invention is characterized by carrying out the bearing of at least one in a transfer wheel train or generation-of-electrical-energy Rota by the 2nd ball bearing while having generation-of-electrical-energy Rota which gears with the transfer wheel train which tells rotation of a rotation spindle, and is rotated and carrying out the bearing of the rotation spindle by the 1st ball bearing.
[0015] In this case, it is desirable to be constituted so that jogging also of the transfer wheel train or generation-of-electrical-energy Rota where the 2nd ball bearing consists of [upper part / the ball which contacts a transfer wheel train or generation-of-electrical-energy Rota, and / of this ball / the lateral portion and the upper part] the wrap junk rings in a wrap outer ring of spiral wound gasket and the lower part of a ball, and a ball can be moved slightly in the vertical direction at least between an outer ring of spiral wound gasket and the junk ring, and a ball contacts in the vertical direction may be attained.

[0016]
[Embodiment of the Invention] The assembly top view of this invention example, drawing 2 - drawing 7 are the same, and drawing 1 shows a built-up-section Fig.
[0017] In drawing, in the cope plate with which 1 makes the base of a movement, and 2, the coil for clocks and 3 show a stator and 4 shows Rota. Rotation of Rota 4 is transmitted to the No. 4 vehicle vehicle vehicle 9 of No. 8 or 2 of No. 7 or 3, the back vehicle 10 of a day, and a scoop wheel 11 through the No. 5 vehicle 5. Moreover, the back vehicle 10 of a day has geared with the Kotetsu vehicle 12. These wheel train group is supported to revolve with the wheel train receptacle 13.
[0018] The rotation spindle 20 of piece weight is the rotation spindle screw 23, and is being fixed to the ball bearing 22 which fixed to rotation **** 21. Under the rotation spindle 20, there is rotation cord weight 24 and it is fixed similarly. It gears with kana section 25a and the kana section of the generation-of-electrical-energy Rota tradition vehicle 25 with gearing section 25b, and gearing section 25b gears with kana section 26a of generation-of-electrical-energy Rota 26, and the rotation cord weight 24 transmits rotation of a rotation spindle. About 30 to 200 times accelerates the wheel train from the rotation cord weight 24 to generation-of-electrical-energy Rota 26, and generation-of-electrical-energy Rota 26 will be rotated by rotation of the rotation spindle 20 at high speed. In addition, an accelerating ratio can be freely set up with the engine performance of a generator, and the specification of a clock. Since the permanent magnet 27 has fixed in generation-of-electrical-energy Rota 26, the magnetic flux from which a direction differs at every rotation flows to a magneto coil 29 via the generation-of-electrical-energy stator 28, and induced voltage occurs in a coil. It connected with the pattern of the coil lead substrate 39, and the pressure welding of the terminal of a magneto coil 29 was carried out to the circuit board 37 through the circuit pressure plate 38 with the setscrew 44, and it has flowed with the circuit. Although the pressure welding of a magneto coil 29 and the generation-of-electrical-energy stator 28 is carried out with setscrews 46 and 47 and they form the magnetic path, connection of said coil lead substrate 39 and circuit board 37 is removed superficially, and they make it thin.
[0019] Next, as circuit relation, as for the diode for an MOSIC chip and rectification [33] of an auxiliary capacitor and 34 of the Xtal unit and 32, and 35 and 36, 31 shows a pressure-up capacitor. These components are mounted in the flexible circuit board 37. The circuit board 37 is pressed down and fixed with screws from the top with the circuit pressure plate 38 with the spring section. 40 is the capacitor of a secondary power source and electrical connection of each electrode is carried out to the pattern of the circuit board 37 with the plus terminal (not shown) and the minus terminal. The circuit of this example carried out the pressure up of the electrical potential difference of the secondary power source 40 by the pressure-up capacitor 36, and the method of JP,60-203887,A which stores in the auxiliary capacitor 33 and drives a clock is used for it.
[0020] 14 is an external operating member, this actuation is controlled and pushed, **** 15 engages with the slot of the external operating member 14, and location regulation is carried out with the locking bar 16. The plate 16 is engaging with the slot of ****** 17 shown up at the external operating member 14. Moreover, illustration has not been carried out, although the readjustment lever which resets a circuit is owned while a motion of the external operating member 14 is interlocked with and readjusting a wheel train. It pushes and does not keep not solving **** 15, and it was fixed with the setscrew 45, and 16 is pushed, and is having above determined by the **** presser foot 18. About actuation of these change-overs, since it is common knowledge, explanation is omitted.
[0021] In the above-mentioned, the rotation spindle 20 had heavy-gage part 20a in the periphery section, and has taken the locus turning around the outside of almost all the built-in component that constitute a movement. In some magneto coils [at least] 29, in ****, the coil coil section has lapped superficially to the heavy-gage part. Moreover, the coil section of a magneto coil 29 has lapped with gearing 25b of the generation-of-electrical-energy Rota tradition vehicle 25. Moreover, it has lapped with the MOSIC chip 32 and the circuit board 37 which constitute a circuit.
[0022] In drawing 7 , the upper tenon of the generation-of-electrical-energy Rota tradition

vehicle 25 which constitutes a generation-of-electrical-energy wheel train is guided by the bearing ball bearing 50 which fixed to rotation **** 21. Outer-ring-of-spiral-wound-gasket 50a is fixed with rotation **** 21, and, as for the bearing ball bearing 50, two or more ball 50b is engaging with the upper tenon of the generation-of-electrical-energy Rota tradition vehicle 25 soon. Above positioning of the generation-of-electrical-energy Rota tradition vehicle 25 is performed by junk ring 50C fixed to outer-ring-of-spiral-wound-gasket 50a. Moreover, outer-ring-of-spiral-wound-gasket 50a is made from the nonmagnetic ingredient. Although this is for decreasing the magnetic effect affect a generator, when effect can be disregarded, magnetic material, such as steel, is sufficient as it. Moreover, when effect is large, not only an outer ring of spiral wound gasket but the thing changed into nonmagnetic material about other parts is considered. Moreover, the bearing bearing 51 is used also for the bottom tenon side of generation-of-electrical-energy Rota 26. Although it is necessary to use magnetic material and nonmagnetic material also here properly like the above-mentioned about an ingredient, since it says near the magnet, as for an outer ring of spiral wound gasket at least, it is desirable to make it nonmagnetic material. The bearing bearing 51 consisted of outer-ring-of-spiral-wound-gasket 51a, ball 51b, and junk ring 51C, and has determined AGAKI of generation-of-electrical-energy Rota 26 by outer-ring-of-spiral-wound-gasket 51a.

[0023] Although they do not use a retainer but are aiming at a miniaturization and low cost-ization, even if both the bearing bearings 50 and 51 use a retainer, they are satisfactory. As for the bearing bearing 50, near the hole of outer-ring-of-spiral-wound-gasket 51a has become [the skimmer with projection and junk ring 50c] smaller than the outer diameter of ball 50b at the ball 50b side. Therefore, even if it is before inclusion of the generation-of-electrical-energy Rota tradition vehicle 25, ball 50b does not separate. Moreover, before inclusion of the generation-of-electrical-energy Rota tradition vehicle 25, since a ball shifts to some extent, a skimmer with outer-ring-of-spiral-wound-gasket 50a gets bored, and dirt is easy to come off by washing. Since the hole which has opened also about the bearing bearing 51 in outer-ring-of-spiral-wound-gasket 51a and junk ring 51c is smaller than the outer diameter of ball 51b, there is no blank of a ball and it has the same effectiveness. Since the effectiveness of both of the direction of a path is mainly in said bearing, the backlash of the vertical direction may be large.

[0024] In this example, although bearing is used for the bottom of generation-of-electrical-energy Rota 26 the generation-of-electrical-energy Rota tradition vehicle 25 top, this is based on the following reasons. In order to engage with the rotation cord weight 24, kana section 25a is sticking out of the generation-of-electrical-energy Rota tradition vehicle 25 to the rotation spindle receptacle 21 up side. Therefore, in order to take the general configuration guided from the upper and lower sides with a carrier and a cope plate, the diameter of bearing will be made larger than a kana outer diameter, and a bearing load increases. Moreover, since it is drawn by generation-of-electrical-energy Rota 26 and the magnet 27 to the generation-of-electrical-energy stator 28 and the force joins a bottom tenon side, a load increases. By using bearing for these parts, it is effective in reducing a bearing load and making generating efficiency raise. In addition, it will become more efficient if it adopts also about the bottom of a generation-of-electrical-energy Rota tradition vehicle, and a generation-of-electrical-energy Rota top.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The top view of this invention example.
[Drawing 2] The sectional view of this invention example.
[Drawing 3] The sectional view of this invention example.
[Drawing 4] The sectional view of this invention example.
[Drawing 5] The sectional view of this invention example.
[Drawing 6] The sectional view of this invention example.

[Drawing 7] The sectional view of this invention example.
[Description of Notations]
1 Cope Plate
2 Coil for Clocks
3 Stator
4 Rota
5 No. 5 Vehicle
7 No. 4 Vehicle
8 No. 3 Vehicle
9 No. 2 Vehicle
10 Back Vehicle of Day
11 Scoop Wheel
12 Kotetsu Vehicle
13 Wheel Train Carrier
14 External Operating Member
15 Push and it is ****.
16 Locking Bar
17 ********
18 Push and it is **** Presser Foot.
20 Rotation Spindle
21 Rotation ****
22 Ball Bearing
23 Rotation Spindle ****
24 Rotation Cord Weight
25 Generation-of-Electrical-Energy Rota Tradition Vehicle
26 Generation-of-Electrical-Energy Rota
27 Magnet
28 Generation-of-Electrical-Energy Stator
29 Magneto Coil
31 Xtal Unit
32 MOSIC Chip
33 Auxiliary Capacitor
34 Diode
35 36 Pressure-up capacitor
37 Circuit Board
38 Circuit Pressure Plate
39 Coil Lead Substrate
40 Secondary Power Source
41 Minus Terminal
44, 45, 46, 47 Setscrew
50 Bearing Ball Bearing
51 Bearing Ball Bearing

[Translation done.]